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## Automation: From Consoles to DAWs

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### Automation: From Consoles to DAWs

Since the beginning of modern music there has always been a need to implement movement into a mix. Whether it is bringing down dynamics for a classic fade out or a filter sweep slowly building into a chorus, dynamic activity in a song has always been pleasing to the average music listeners. The process that makes these mixing techniques possible is automation. Before I get into details about automation in regards to mixing I will explain common ways automation is used. Automation in a nutshell is the use of various techniques, method, and system of operating or controlling a process by highly automatic means generally through electronic devices. In music however, automation is simply the use of a combination of multiple control devices to alter parameters in real time while a mix is being played. Before the advent of DAWs (Digital Audio Workstation) automation was executed on a mixing console. The process was both tedious and in some ways inconvenient. Nowadays, automation is effortless and commonly used in modern music.

To begin with, automation in music is such a unique and essential component of the mixing process. Though using it increases one's amount of creative options and can be beneficial for an artist it can also have its' drawbacks as one can get lost in the endless amount of possible ways to modify the automation. (Matla) Musician Joshua Ollerton explains automation can be used for controlling and plotting parameters throughout a track within your DAW, which is extremely

useful for channeling flow and creating energy in a production. Using automation is a useful tool for adding variation and extra detail in a project. Automation is a way create natural movement in sound and can allow a track to induce tension.

Automation today is commonly used in DAWs primarily because it is easier, more accessible and more convenient however, there are those who still prefer the conventional technique an analog machine provides. Ever since the beginning of digital recording there has been a never ending debate to determine whether digital or analog is a more beneficial recording process. Many people love the warmth and tape noise that an analog provides while others prefer the cleaner sounding timbres of digital converters. In addition, digital recordings converts certain properties from the original timbre into a series of numbers that is saved and reproduced. These numbers are generated by a small microphone attached to an analog to digital converter otherwise known as an ADC. Similar to analog the signals are is converted into an analog signal. Some components of digital converters can be complex, though they require less maintenance than analog. Moreover, the encoded information a digital system provides is more durable than an analog information because circuits are simply merely responding to the presence of signal.

Analog recording retains original characteristics and timbres of an original recording. The tape is a thin magnetic strip of plastic which is usually refined rust or iron oxide. (Elsea, “Analog Recording of Sound”). Once the air pressure is converted into an analog signal the same amount of voltage and air pressure is deployed. These signal variations are eventually converted and recorded onto devices such as tape and recorder or cutting lathe (Wiki, 2016). The process happens at a record head which is a recording device used to transform electrical energy into a

magnetic record on a disc. After, the tape passes through the record head it slowly passes through the play head coil, the part of a tape recorder used to pick up the magnetic patterns (at high frequencies) on tape to create play back material previously recorded.

Before the advent of modern software mixing engineers who wanted gradual progression in their music had to resort to manually moving knobs and faders on a soundboard. Most artists would



use analog mixing consoles and the only way to automate a mix was through an add-on system which consisted of only volume and mute adjustments. To proceed with any other automation one had to make alterations to a mix by hands. Mixes that had dynamic changes throughout a song typically

required another hand from either a producer, engineer, artists, etc. to help automate at a specific time. If one had a mixer with enough channels and wanted to make significant changes to the timbre of each track one would multiply the output of the tracks to separate channels on the board. After, these channels are routed to discrete EQ's and processing that is necessary and then automate which channel played in the corresponding section of the song using the mute automation on the console (Sherrard).

Similar to the many essential tools taken for granted in contemporary DAWs, mix automation was merely a solution to a problem. In the early 70's, the most advanced technologically advanced studios were working with eight-track tape machines. Later that decade, synchronized 24-track machines were primarily used. This however, made it difficult for one to mix manually, so there would often be four to five hands controlling one console. The process was strenuous and impossible to reproduce. This process was not convenient and was soon to be outmoded. Consoles made by SSL, Neve, AEA introduced systems that allowed one to record, layer, and playback automation giving the engineer the opportunity to manage all aspects of a complicated mix. The SSL desk, for example, helped engineers like Bob Clear Mountain to invent the career path of "specialist mix engineer" ("Creative Mix Automation in Your DAW"). Modern studios use computers as their primary mixing device and the accompaniment of the DAW software allows for more comprehensive mix automation. The image below shows a project with several automation tracks on the popular DAW *Logic Pro X*.



On the early DAWs automation was introduced and used as alternative way to record playback and fader movements on a MIDI continuous controller. This popular approach gave one the ability to use MIDI data to control certain parameters in a mix. Most DAWs however, have automation data types that can record and edit fader movements more precisely (Inglis). In a DAW there are two main ways to add automation to a mix. There is real time which will put your modified parameters into write mode which would enable playback and either physically moving the faders on a control surface or in most cases using a mouse to control manipulate on-screen controls. Once all moves are made write-mode turns off and during playback on-screen faders will move according to the automation pass. If mistakes are made during the process one can simply re-record the sequence or in most cases one can use alternative automation passes to alter preexisting automation on a track (Inglis).

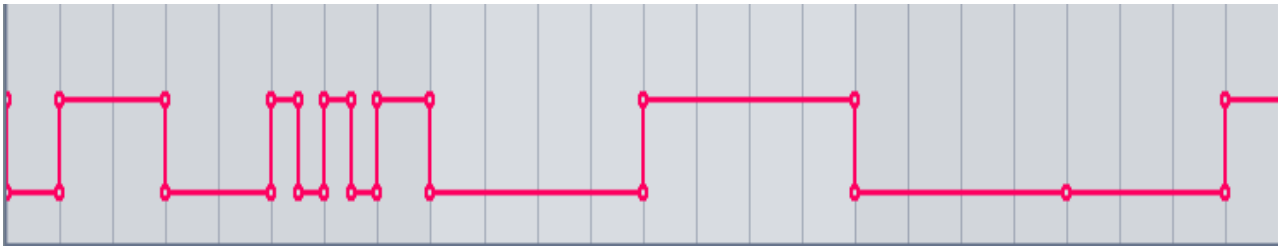
In Sam Matla's article, "The Definitive Guide to Automation in Electronic Dance Music" he explains the four types of visual automations: fades and curves, binary, steps, and spikes. Fades and curves are the most commonly used. Fades and curves are often used to automate volume, dry/wet on effects (i.e. reverb), ADSR values, and EQ and filter parameters such as high and low pass filters and pitch modulation. Though rarely, binary automation can also be used for transitional effects such as glitch, and bit crush (Matla). I used this style of automation in my song "Down3." In the short 1:36 song I used fades to automate the volume of the ambient forest sample that slowly builds from 0:36 and abruptly ends at the: 48 mark. I used a similar technique with the white noise transition effect that begins at: 46 to: 48 however; instead suddenly muting I left a short tail overlapping the very beginning of the verse section.



### **(Fade and Curve)**

Binary is another commonly used type of automation. Binary forms are rectangular shaped and are typically used to automate instantly, like a break of silence in a beat or an abrupt change in volume from one song to another. This type of automation is often used to automate on/off on synths and effects, to mute and unmute sounds for low pass and high pass filters and EQ's, synth functions (oscillators, pitch bend, low frequency oscillators) (Matla). Throughout my album I

used a variety of binary forms. Mainly I would use the binary form to temporarily mute synthesizers and samples along with reverb and delay. For example, in the song “Hyper 2” I use binary shapes to automate the bright synthesizers in the chorus around the 1:00 mark. Oftentimes when reverb is used in a mix it is very difficult to mute and unmute because it often fades out slowly. I wanted to create a sudden change of mood and separation from verse to chorus so I made a square-like automation form to mute the reverb.



**(Binary)**

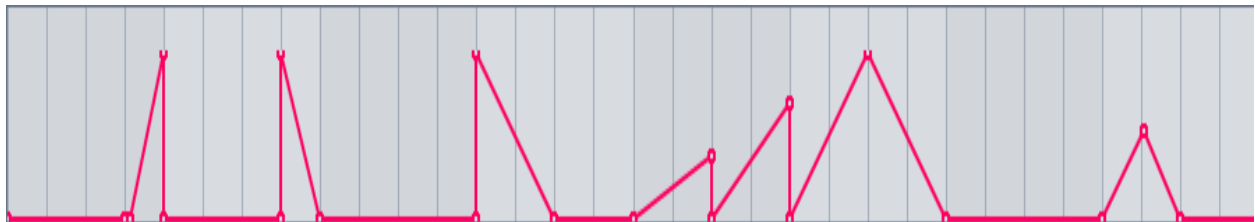
Another automation technique worth noting is the step automation. This is where the automation progresses in a step motion. Uses include transposition typically from one key to another, dry/wet on effects a/b crossover on synths or effects (some plugins allow for an A and B setting which can be switched between and even crossfaded), and synced rhythmic effects (gating effects, LFO, stutters, etc.). Step automation can be found in more rigid, edgy timbres heard in such genres glitch hop, and techno and will unlikely be heard in soft ambient music like chill wave or trance (Matla).





**(Step)**

Finally, there are spikes. Spikes are another commonly used automation technique. Similar to fades, spikes are either inclined or declined however the fades are not very long they are more sudden. Spikes can often be heard at the ending of a vocal sample to eliminate breathing before and after words. Spike automation can also be found in transitional effects (i.e. distortion and reverb), short filter automation (e.g. bringing up a filter cutoff quickly), and pitch (Matla).



**(Spikes)**

Matla mentions that there are “three layers of automation”: problem solving, flow, and creativity. Problem solving is a necessary element to start with. For example, if the beginning of a song is too loud one might automate the low frequency on an EQ to attenuate the low end. Another example would be adding a low pass filter to a vocal sample to create space for the singer. This technique can be heard in songs such as Drake’s “305 To My City” and Bryson Tiller’s “Self-

Righteousness.” One might get too eager and overuse automation to fix a problem which can complicate the fundamental issue and in many cases can halt one’s workflow. Flow automation is used to smooth things out typically during transitions or breakdowns. This process is very similar to problem solving however, the key problems are not addressed as much. Matla describes it as “like sanding and smoothing a piece of furniture you’ve made.” Lastly, creative automation occurs when all the main problems are solved and the finishing touches are made. The best way to approach it is to use more **subtractive automation** rather than additive. It embellishes and adds complexity to a mix.

Another aspect of DAW automation is the distinctions between offline automation and online automation. Online automation is basically the adjustments made in real time whereas offline automation refers to the adjustments made without playback, typically within a graphic interface.

During online automation controllers such as faders and rotary knobs are moved during playback and the automation remembers each move made (Savage 124). Once it operates through a recording device the movements are recorded as they were made and then played back on consecutive replays. The term often used to describe this process as “write” (Savage 124-125). Written automation data as controllers are moved and “read” during playback. The automation has to be engaged and prepared for write mode which is often represented by a flashing red light (Savage 124).

Offline automation on the other hand, will allow one to exceed fine control over both the position and amount of controller changes. The process can be maximized with a DAW, but not so much with analog console, which has its limitations and can be an inconvenience given the technology. Off-line allows one fine control over the dynamics of the position and amount of controller changes. (Savage 125).

Another important aspect of DAW automation is the various modes of automation. Auto read is essentially the playback of the automation. A DAW or an automated console when placed in read mode will play the information that is contained in the mix from the automation data of the system. This allows the faders on screen to follow or match the mix moves in real time. When the final mix is completed all that is needed is to press the play button and enjoy the mix (Huber).

Auto write is when the first move is made and in some cases it can permanently overwrite any preexisting automation clip. When the mixdown process is initiated, writing the automation data into the system's memory begins. The system will also begin encoding the mix moves from selected channels in real time (Huber 465). The write mode is also used to record moves and also settings on a variety of selected strips. This process will continue until the mix is built up which allows the opportunity to pay special attention to particularly important parts of the mix.

Auto latch is a mode that writes automation data only while a fader is touched/faders return to any previously automated position after release. Lastly, there is the Auto off occurs when the automation is turned off completely. Auto touch is the mode very similar to latch, however, the

parameter reverts back to its original automation position once the fader or knob is let go. Touch automation is also referred to as rubber bands which essentially means that the value will snap back to its original level.

One of the ways to control various automation parameters is the editing and drawing of the rubber bands on screen. This form of automation also allows users to draw complicated mix and fades moves over time. This interface gets its name because of the graphic lines that represent the fade, volume, pan and other parameters that can be stretched and bent like a rubber band. In order to create a new mix point, it is important to click on a point on the rubber band and drag it to the desired position. Rubber band controls are also capable of displaying a graph reflective of the moves and turns occurring in each mix. Rubber band control interfaces also allows the users to see a visual, draw to adjust, and edit graph details if needed.

Once one has recorded, edited, and assembled the tracks then one will use the techniques that were discussed to mix the tracks and create your final media form. The end result of this process is to combine audio, effects tracks and MIDI to create a form that is pleasing to the ear. In this process traditional tools are utilized such as:

- Effects Processing
- Level Balancing
- Equalization
- Spatial Positioning

- Dynamics Processing

Efficiently automating dynamics and effects can be the key factor to a mix. The ability to adjust levels and control parameters of any mix and automatically adjust to suit makes it possible for production sessions to be scribed onto a disc to save and recollect information from a particular session.

Although several automation controlling interfaces provide access and the ability to edit and recall information within a mix; many professional engineers suggest that when progressively working on a mix it is best to save each mix version so that nuances are preserved. Since it is not all of the time that the variables or the moves in a mix can revert and be edited, it is safer to save alternate mix versions on a regular basis especially when one is actively working.

Alternately mix versions can be uniquely titled, numbered, and saved to make alternate versions more memorable, to also create a way to differentiate and categorize mixes.

Another way of adding automation is on an editing window. Most DAWs allow one to view their automation data graphically on an edit window or arrange window that provides a plethora of editing tools to edit recorded data. The editing window allows one to improve automation recorded in real time. Mixing parameters in this way is much more convenient. When editing in this way one can edit more accurately with the option to zoom in and out and or even view the automation pass layered with the waveform on the track to which they relate making the editing process much more precise. It also allows one to create smoother automation fades and moves without creating an overly complex passes.

Automation in digital recordings is a process that is omnipresent in today's music. Certain genres such as trap and electronic music has hundreds if not thousands of automation alterations in one song. Other genres like rock and metal uses automation in a variety of ways. Blogger Finn Mckenty states, "In rock or metal, drum tones are usually a blend of several layers of samples. The 'snare' might be made up of several snare samples: one for the crack, one for the body, one for the ring, and so on." In electronic music, one would often automate the envelopes to create rising transitions or even a slowly increasing snare roll. Another common use of automation is on a filter sweep. Mckenty mentions that one would "automate EQ shape over time to let a sound 'emerge' like the 'get low, get low' sample that starts at :22 in DJ Snake 'Get Low' and builds into the drop."

In a mix automation is one of most important aspects, if not the most important. While it may be very common for one to set levels for each track it is not often that it will sound as good throughout the song. In moments like these, automation specific features of a song can be a beneficial way to create consistency throughout a track.

Vocal Automation is a very unique mixing process. Within a vocal mix it is mainly used to smoothen out vocals, balance dynamics and eliminate unwanted artifacts in a recording. While compressors are often used as somewhat of an integrated volume automation, the settings of a compressor doesn't compare to the dynamic consistency of vocal automation. As Inglis states in "Why You Should Use Automation in Your Mix" states, "if you use a compressor on a vocal

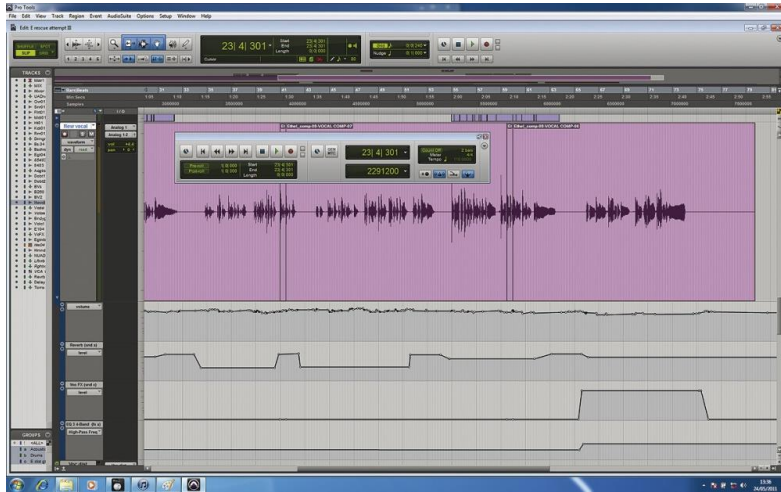
track with a very large dynamic range, the settings that work great for the soft vocals may make the loud, grand portion of the vocals sound lifeless. Using volume automation can allow you to use a great compressor setting while still controlling the level of the vocal.” In the song “Total Recall” featuring rapper Boniface I automated all sounds on his vocal track that were not wanted. For example, low level artifacts like the, headphone bleed, and also unwanted timbres that appear from applying compression such as the clicking of the mouse and noises from the computer fan.

Vocals are an integral part of a mix. The most attention to detail is often on the mixing and processing of the vocals. As mentioned before, a compressor is somewhat limiting. It can only do so much to make a vocal mix sound top-quality. In addition, compression uncovers quiet noises once gain is increased. Manipulating the vocals syllable by syllable can indeed be very tedious but in order to maximize the sound quality of a mix one has to be very thorough. It is important to go through multiple automation passes on a vocal track. It is also important to focus details such as zooming in on an individual words and balancing the levels of each one all the while reducing the levels of unwanted sounds such peaks, puffs, and popping caused by an excessive amount of air passing through a microphone and also mouth clicks, noises from lyric sheets and headphone bleed. Furthermore, overall levels from intro to chorus should be evenly balanced and consistent.

Largely dynamic vocal performances can be difficult to mix with compression. For one, specific compressor settings that work well for a quiet vocal part might not sound as balanced and may

be too aggressive for louder parts. The article, “Creative Mix Automation In Your DAW” discusses how automation can solve this issue: “the answer is often to use automation to even out the level of the vocal prior to its going into a compressor — if your DAW provides post-fade insert slots, place your compressor into one, or alternatively, bus the automated vocal track to an auxiliary or group and compress that.” Automation on vocals is often an extensive process that transcends normal vocal mixing techniques. In addition, it is vital to automate vocals based on genre, for example, in genres like electronic dance and rock vocals are frequently sent to multiple effects such as compression, delay, and reverb are routed to send tracks. These send tracks, when automated, add a special dynamic to a mix and be helpful for problem solving level balancing. However, an aggressive delay on a chorus will not need the same amount of gain as a subtle intro vocal. A unique way to solve this problem “is to send only the last word in a vocal phrase to a tempo-sync’d delay (Inglis). Another aspect of automating vocals that can be problematic are sibilants. Sibilants are “speech sounds produced by forcing air through a constricted passage” (vocabulary.com). Sibilants typically consist of hissy “es”, “sh”, “zzz”, or words with hard p’s and f’s. These sounds are too present when reverb or compression is added. To mitigate this trouble one can use a de-esser on the vocals or one can automate the send so that sharp sounding sibilant sounds simply don't reach the other effects like reverb. Though it may seem tedious and time-consuming, however, one would only need to automate it once if there are similar preexisting automation curves that can be sent to each vocal track. The graphic below shows an automated vocal track. The automation points directly under the vocals are a combination of points made to attenuate the high peaks in the track.





Another issue with recording vocals is choosing the right microphone to record with.

Frequency responses for directional microphones are low and this affects the distance in

which a singer is positioned. If too

far away from the microphone quiet and low vocal dynamics becomes more apparent and makes the mixing process more difficult. One can repair the varying dynamic of the vocals by automating an EQ: “Automated EQ can also be used to achieve the oft-used 'telephone vocal' effect, by introducing very drastic low and high-pass filters; and when a vocalist 'pops' the mic, you can often make it far less noticeable by momentarily introducing a drastic high-pass filter at 200Hz or so (Inglis).

Furthermore, automating EQ dynamics also works well on instruments. For songs that use a wide variety of instruments (i.e. guitars, bass, vocals, drums) that come in and out of a mix, EQing is often automated individually to separate the distinct timbres of the instruments. “As a simple example, consider a song that begins with guitar, before bass, drums and other instruments join the mix later on. It may well be that the busier sections of the arrangement benefit from thinning out the low end of the guitar sound quite a lot, but that the same EQ settings make the exposed guitar at the start of the song sound tinny” (Inglis). In a situation it is best to EQ the parameters high frequencies on the guitar to alleviate some of the low end. The

same technique can be used for automating drum sets. Recording drums requires several microphones setups both close and distant. A good way to approach mixing each recording is to apply separate EQs to each instrument so they are well separated and full. EQ may be intensified if there are instruments that bleed into an unassigned microphone like the sound of a hi hat bleeding into a snare drum mic or a cymbal bleeding into a microphone assigned for toms.

To conclude, mixing automation has come a long way from its days as a tedious technique on a mixing board to becoming a prevalent asset in genres of all sorts. As discussed through the examples of shapes, curves, and steps produce dynamic effects that bring life and character to music. It is the intricate detail that this technique contributes to a production that creates a sonically pleasing experience for the listener. Automation has been most effective on DAWs where there are a multitude of ways to manipulate and make unique designs with distinct capabilities. It has also been a really efficient way to edit vocals tracks, which is often the most lengthy and comprehensive process. In addition, it has been useful for eliminating sibilants and other unwanted artifacts that are often picked up during a vocal recording. EDM heavily utilizes this technique; in fact, hundreds of automation passes can be contained in one track alone.

Automation is the most vital production technique that will continue to revolutionize music.

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